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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/698,039

10/30/2003

Hidenori Usuda

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27572 7590 04/18/2007
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EXAMINER

MRUK, GEOFFREY S

ART UNIT

PAPER NUMBER

2853

MAIL DATE

DELIVERY MODE

04/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

Interview Summary	Application No.	Applicant(s)	
	10/698,039	USUDA, HIDENORI	
	Examiner	Art Unit	
	Geoffrey Mruk	2853	

All participants (applicant, applicant's representative, PTO personnel):

- (1) Geoffrey Mruk. (3) _____
 (2) Brent G. Seitz. (4) _____

Date of Interview: 12 April 2007.

Type: a) ☒ Telephonic b) ☐ Video Conference
 c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.
 If Yes, brief description: _____

Claim(s) discussed: independent claims 1 and 14.

Identification of prior art discussed: Arakawa et al. (US 6,270,180 B1).

Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The proposed draft amendments to independent claims 1 and 14 were discussed. The proposed draft amendments raise 112 first paragraph best mode issues. Further, the proposed draft amendments do not overcome the rejection dated 31 January 2007.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.



STEPHEN MEIER
SUPERVISORY PATENT EXAMINER

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

 Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

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*Attach to
interview summary.*

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

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1. (Currently Amended) A droplet discharging apparatus comprising:
an aperture through which liquid droplets are discharged by mechanically deforming a piezoelectric element using a normal drive signal;

wherein the piezoelectric element is subjected to a heating drive signal of a repetitive frequency in an ultrasonic band when the aperture is positioned in an image formation region, the heating drive signal is insufficient to cause droplets from being discharged through the aperture thereby facilitating heating of the droplets;

a single waveform generating section that generates both the normal drive signal and the heating drive signal based on data generated by an arithmetic control section, the normal drive signal and the heating drive signal are generated during different time periods and are not generated simultaneously, the waveform generating section does not include separate sections that generate one of the normal drive signal and the heating drive signal, the normal drive signal and the heating drive signal are always present on the same signal path ~~transition between generation of the normal drive signal and generation of the heating drive signal is a switchless operation;~~

an X-direction drive motor that moves the aperture in an X-direction and a Y-direction drive motor that moves the aperture in a Y-direction, the X-direction drive motor and the Y-direction drive motor each in receipt of inputs from the arithmetic control section, which receives setting information generated by a control computer;

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a switching circuit in receipt of at least one of the normal drive signal and the heating drive signal; and

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a switching signal generator in receipt of selection data generated by the arithmetic control section, the selection data designates one of the normal drive signal and the heating drive signal to be applied to the piezoelectric element.

2. (Original) The droplet discharging apparatus according to Claim 1, wherein the heating drive signal is applied to the piezoelectric element immediately before a droplet is discharged by the normal drive signal.

3. (Original) The droplet discharging apparatus according to Claim 1, wherein the heating drive signal is applied to the piezoelectric element while a droplet is being discharged by the normal drive signal.

4. (Original) The droplet discharging apparatus according to Claim 1, wherein the heating drive signal is applied to the piezoelectric element if the temperature of a discharge liquid that is detected by a temperature detecting means drops below a predetermined threshold temperature.

5. (Original) The droplet discharging apparatus according to Claim 1, wherein the repetitive frequency of the heating drive signal is 40 kHz or more.

6. (Original) The droplet discharging apparatus according to Claim 1, wherein the amplitude of the heating drive signal is half that or less of the normal drive signal.

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7. (Original) The droplet discharging apparatus according Claim1, wherein the discharge liquid is a printing ink.
8. (Original) The droplet discharging apparatus according to Claim 1, wherein the discharge liquid is an electrically conductive material for forming a wiring pattern.
9. (Original) The droplet discharging apparatus according Claim 1, wherein the discharge liquid is a transparent resin for forming a microlens.
10. (Original) The droplet discharging apparatus according to Claim 1, wherein the discharge liquid is a resin for forming a color layer of a color filter.
11. (Original) The droplet discharging apparatus according to Claim 1, wherein the discharge liquid is an electro-optic material.
12. (Original) The droplet discharging apparatus according to Claim 11, wherein the electro-optic material is a fluorescent organic compound presenting electroluminescence.
13. (Previously Presented) The droplet discharging apparatus according to Claim 12, wherein the heating drive signal is applied to the piezoelectric element before, during and after a preliminary discharging operation.
14. (Currently Amended) A droplet discharging method comprising:

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discharging liquid droplets through an aperture by mechanically deforming a piezoelectric element using a normal drive signal;

heating the discharge liquid by subjecting the piezoelectric element to a heating drive signal at a repetitive frequency in an ultrasonic band when the aperture is positioned in an image formation region, the heating drive signal is insufficient to eject the discharge liquid through the aperture, thereby facilitating heating of the droplets;

generating both the normal drive signal and the heating drive signal using a single waveform generating section based on inputs received from an arithmetic control section, the normal drive signal and the heating drive signal are generated during different time periods and are not generated simultaneously, the waveform generating section does not include separate sections that generate one of the normal drive signal and the heating drive signal, the normal drive signal and the heating drive signal are always present on the same signal path ~~transition between generation of the normal drive signal and generation of the heating drive signal is a switchless operation;~~

controlling an X-direction drive motor that moves the aperture in an X-direction and a Y-direction drive motor that moves the aperture in a Y-direction using the arithmetic control section in receipt of setting information generated by a control computer;

outputting at least one of the normal drive signal and the heating drive signal to a switching circuit; and

generating selection data using the arithmetic control section and outputting the selection data to a switching signal generator, the selection data designates one of the normal drive signal and the heating drive signal to be applied to the piezoelectric element.

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15. (Original) The droplet discharging method according to Claim 14, wherein the heating drive is carried out immediately before the normal drive for discharging a droplet.

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16. (Original) The droplet discharging method according to Claim 14, wherein the heating drive is carried out during the normal drive.

17. (Original) The droplet discharging method according to Claim 14, wherein the heating drive is carried out if the temperature of a discharge liquid drops below a predetermined threshold temperature.

18. (Original) The droplet discharging method according to Claim 14, wherein the repetitive frequency of the heating drive is 40 kHz or more.

19. (Original) The droplet discharging method according to Claim 14, wherein the heating drive is carried out at an amplitude that is half that or less of the normal drive.

20. (Original) The droplet discharging method according to Claim 14, wherein the discharge liquid is a printing ink.

21. (Original) The droplet discharging method according to Claim 14, wherein the discharge liquid is an electrically conductive material for forming a wiring pattern.

22. (Original) The droplet discharging method according to Claim 14, wherein the discharge liquid is a transparent resin for forming a microlens.

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23. (Original) The droplet discharging method according to Claim 14, wherein the discharge liquid is a resin for forming a color layer of a color filter.

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24. (Original) The droplet discharging method according to Claim 14, wherein the discharge liquid is an electro-optic material.

25. (Original) The droplet discharging method according to Claim 24, wherein the electro-optic material is a fluorescent organic compound presenting electroluminescence.

26. (Previously Presented) The droplet discharging method according to Claim 14, wherein the heating drive signal is applied to the piezoelectric element before, during and after a preliminary discharging operation.

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REMARKS

Claims 1-26 are now pending in the application. Claims 1 and 14 are now amended. The claim amendments are fully supported by the application as filed and do not present new subject matter. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 1 and 14 stand rejected under 35 U.S.C. § 112, first and second paragraphs. Specifically, the Office Action asserts that the following claimed features were not sufficiently described in the specification as filed and are indefinite: "transition between generation of the normal drive signal and the generation of the heating drive signal is a switchless operation." Applicant now deletes this subject matter from Claims 1 and 14. Therefore, this Section 112 rejection is now moot.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-7 and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Toye (U.S. Pat. No. 4,068,144) in view of Arakawa et al. (U.S. Pat. No. 6,270,180 B1), and further in view of Hertz et al. (U.S. Pat. No. 4,050,075).

Claims 8-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Toye (U.S. Pat. No. 4,068,144) in view of Arakawa et al. (U.S. Pat. No. 6,270,180 B1), and Hertz et al. (U.S. Pat. No. 4,050,075) as applied to Claims 1-7 above, and further in view of Speakman (U.S. Pat. No. 6,503,831 B2).

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Claims 14-20 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Toye (U.S. Pat. No. 4,068,144) in view of Arakawa et al. (U.S. Pat. No. 6,270,180), and further in view of Hertz et al. (U.S. Pat. No. 4,050,075). 4/12/07

Claims 21-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Toye (U.S. Pat. No. 4,068,144) in view of Arakawa et al. (U.S. Pat. No. 6,270,180), and Hertz et al. (U.S. Pat. No. 4,050,075) as applied to Claims 14-20 above, and further in view of Speakman (U.S. Pat. No. 6,503,831).

These rejections are respectfully traversed.

Independent Claims 1 and 14 are now amended to recite as follows: "the normal drive signal and the heating drive signal are generated during different time periods and are not generated simultaneously, the waveform generating section does not include separate sections that generate one of the normal drive signal and the heating drive signal, the normal drive signal and the heating drive signal are always present on the same signal path."

The Arakawa et al. reference appears to disclose, with reference to Figure 7, a heat-waveform generating section 151 and a separate drive-waveform generating section 152. Switch 153 selects between the heat-waveform generating section 151 and the drive-waveform generating section 152. It appears that the heat waveform generated by the heat-waveform generating section 151 is generated simultaneously with generation of the drive waveform by the drive-waveform generating section 152. This is why the switch SW 153 is necessary. If the waveforms were generated at different time intervals, as set forth in amended Claims 1 and 14, then selection between the heat waveform and the drive waveform would occur without the need for

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the switch SW 153. Therefore, the Arakawa et al. reference fails to disclose or suggest "the normal drive signal and heating drive signal are generated during different time periods and are not generated simultaneously, the waveform generating section does not include separate sections that generate one of the normal drive signal and the heating drive signal," as set forth in amended Claims 1 and 14. Further, the cited Toye, Hertz et al., and Speakman references fail to disclose or suggest these features of amended Claims 1 and 14.

The Arakawa et al. reference further discloses providing the heat waveform and the drive waveform on separate signal paths prior to the waveforms being combined onto a single signal path upon passing across the switch SW 153. Thus, the Arakawa et al. reference fails to disclose or suggest "the normal drive signal and the heating drive signal are always present on the same signal path," as set forth in amended Claims 1 and 14 (emphasis added). Further, the cited Toye, Hertz et al., and Speakman references fail to disclose or suggest the above cited features of amended Claims 1 and 14.

As set forth above, the cited art fails to disclose or alone suggest each and every feature of amended Claims 1 and 14. Therefore, combination of the cited art fails to render amended Claims 1 and 14, as well as those claims dependent therefrom, obvious. Applicant respectfully requests reconsideration and withdrawal of the Section 103 rejections.

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CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: _____

By: _____

G. Gregory Schivley
Reg. No. 27,382
Bryant E. Wade
Reg. No. 40,344

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